

Derivatives Lab

Session 2

September 6, 2011

1. (From Ross, p. 45.) An individual who plans to retire in 20 years has decided to put an amount A in the bank at the beginning of each of the next 240 months, after which she will withdraw EUR 1000 at the beginning of each of the following 360 months. Assuming a nominal yearly interest rate of 6% compounded monthly, how large does A need to be?
2. Write a Python program which prints out an amortization schedule for a mortgage.
The program should take as input the nominal yearly interest rate r , the amount of the loan P , the number of compounding periods per annum m , and the term of the mortgage n in years. Assume that the mortgage is fully redeemed at the end of the term.
The program should compute the monthly payment, the effective annual interest rate, and a detailed payment schedule listing, for each month, the interest and principal parts of the payment and the remaining principal.
3. Find a closed form formula for the remaining principal right after the k th mortgage payment.
4. An investment sold at price P is guaranteeing a cash flow C_1, \dots, C_N at the end of each year. Write a program to compute its IRR (internal rate of return).

Run your program on the following test case:

```
N = 20
C = 100.0 * arange(3,N+3)
P = 20000.0
```